

CHRONOGRAPH-TYPE WATCH

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BACKGROUND OF THE INVENTION

The present invention concerns chronograph-type watches. Such watches allow a period of time to be measured from a given moment, control being carried out by an application of pressure on one or more push-buttons. It relates more specifically to a watch provided with a movement comprising:

- current time display means,
- measured time display means,
- 15 ▪ a time base arranged for adjusting both the current time and measured time display means,
- a control device for starting and stopping the measured time display means, and
- a reset device for resetting the measured time display means when a measurement is finished.

This watch further comprises a case acting as a housing for the movement and including at least one push-button for controlling the control and reset devices. Some of these watches comprise only one push-button for controlling both devices, others, more commonly, comprise two distinct push-buttons.

Such watches are liable to inadvertent manoeuvres. Thus, a shock on one of the push-buttons can suddenly stop a measurement that is being carried out. Such a situation can also occurring during diving, when the water pressure acts on the start-stop push-button and can interrupt a measurement that is being carried out, which may, at the very least, be detrimental.

Moreover, it is possible to make watches that comprise a single hand capable of displaying several pieces of information, like for example the minutes of the current time and the minutes of the measured time. One such watch is disclosed in EP Patent No. 02022505.8. In order to avoid any uncertainty as to the information being displayed, it is desirable for the passage from one function to another to occur clearly. This can be achieved by locking the chronograph mechanism while the hand with a dual display function is indicating information other than that relating to the measured time.

SUMMARY OF THE INVENTION

It is an object of the present invention to overcome these drawbacks. Thus, the watch
5 according to the invention is characterized in that it further comprises a locking device,
arranged for cooperating with the control device, and capable of occupying first and
second positions in which the control device can or cannot be activated, and an
activating member that can be accessed from outside the case to control the locking
device. Owing to this locking device, it is thus possible to prevent any accidental
10 manipulation.

Of course, chronograph-type watches are known wherein the push-buttons can be
screwed onto the middle part, so as to improve water resistance. It is quite clear that a
screwed-in push-button becomes inoperative. Such an operation requires however
15 certain care, each push-button having to be locked by itself. If there is a control
member accessible from the outside of the case, which controls the locking member, it
is possible to lock the two push-buttons simultaneously. The control member can
either be a push-button or a crown, depending upon the desired purpose.

20 When the measured time display means also allow other information to be displayed, it
is desirable for the control device to be inactive while the measured time display
means are displaying this other information. For this purpose, the locking device is
arranged such that it can only act on the control device when the measured time
display means are at zero or are displaying information other than the measured time.
25 Consequently, while the measured time display means display information other than
the measured time, any action on the control member, and thereby on the locking
device, enables the control device and resets the dual display hand to zero. In this
case, the control member is advantageously a push-button.

30 During some measurements, it is desirable to be able to keep the information until it
can be noted down or used. In order to allow information to be saved, the locking
device is designed so as to enable or disable the reset device.

The locking device advantageously comprises a locking part which acts on the push-
35 button in order to immobilise it. Consequently, the push-button cannot be accidentally
moved, either by a movement of the user, or by water pressure during a dive.

In a variant, the locking device includes a mobile connecting part arranged such that, depending upon the position that it occupies, an application on the push-button either is or is not transmitted to the control mechanism.

- 5 It is also possible to combine the presence of a mobile connecting part with locking the push-button. In this case, during the locking operation, the push-button can be moved, so as to place its sealing gasket under stress and thus reinforce water resistance.

10 In order to allow the user to know which state the chronograph mechanism is in, the locking device further includes a display member visible on the watch dial, for indicating the position occupied by the locking device, and consequently, whether or not the control device can be activated.

15 The activating member can be formed of a crown pivotably mounted on the case. It can also be formed of a push-button.

In a particularly simple embodiment, the locking device includes:

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- a stem arranged through the case and for carrying the crown comprised in the control member, and a pinion at its end inside the case,
 - a ring surrounding the movement and provided with a toothing over one portion of its edge adjacent to the pinion, and capable of occupying two positions, the passage from one position to the other occurring via a movement of rotation, and
 - 25 ▪ an interposed member, secured to the ring and cooperating with the push-button so that it can or cannot act on the control device.

Other features and advantages of the invention will appear from the following description, made with reference to the annexed drawing.

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BRIEF DESCRIPTION OF THE DRAWINGS

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- Figure 1 shows a watch provided with a mechanism according to the invention,
 - Figures 2a and 2b illustrate a chronograph mechanism provided with a member for locking the single "start-stop" function, fitted to the watch of Figure 1,

- Figures 3 to 3d concern a device for making the "start-stop" and "reset" push-buttons inactive by locking them,
- Figures 4 to 4d show a device for uncoupling the "start-stop" and "reset" push-buttons, making them inoperative.

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DESCRIPTION OF THE PREFERRED EMBODIMENT

The watch shown in Figure 1 is of the chronograph type. It includes, in a conventional manner, a case 10 acting as a housing for a movement, which carries a dial 12, current time hour hand 14, current time and measured time minute hand 16 and measured time second hand 20.

Display of the current time is corrected by means of a time setting crown 22, connected to the members of the movement by a time setting stem that is not visible in the drawing.

The timing functions are carried out by three push-buttons 24, 26 and 28 respectively arranged at two o'clock, four o'clock and eight o'clock. Push-button 24 controls the starting and stopping of a measured time measurement, whereas push-button 26 resets hands 16 and 20 when a measured time measurement has been interrupted. Finally, push-button 28 allows the chronograph mechanism to pass from a first state, in which it is locked, into a second state in which it is unlocked.

When the chronograph mechanism is locked, hand 16 displays the minutes of the current time, whereas, when it is unlocked, it indicates the measured time. In the locked state, push-buttons 24 and 26 are inactive. In order to pass from one of these states to the other, the mechanism includes a locking device which will be described in more detail hereinafter and which has the effect of making push-button 24 inoperative when the mechanism is locked, whereas push-button 28 is inactive when a measurement is being made.

This mechanism forms part of a movement that comprises, in a conventional manner that is not visible in the drawing, an energy source, such as a barrel, a time base such as a sprung balance, a going train, of which only one mobile 29 is visible in Figure 2a, and an escapement connecting the going train to the balance in order to maintain the latter, as well as time setting and chronograph mechanisms. The various components

of the movement are arranged on a frame 30, formed of a plate and bridges, which assures the relative positioning of the various mobile parts.

As explained hereinbefore, the chronograph mechanism shown in Figures 2a and 2b, which is described in more detail in EP Patent Application No. 02022505.8, displays the minutes of the measured time and of the current time with a single hand 16. The part of the mechanism relating to the "start-stop and "reset" controls could easily be replaced by any other existing chronograph mechanism.

- 10 The mechanism shown in the drawing essentially comprises locking, control and reset devices, whose component parts are identified by the first two numbers of their reference, starting respectively with 32, 34 and 36. The springs included in this mechanism are schematically represented by arrows identified by the letter "F" followed by the number corresponding to the reference of the part on which it acts.
- 15 The arrow is oriented, approximately, in the direction in which the spring exerts its force.

Locking device 32 includes:

- 20 - a switching member 321, comprising:
- a bird-shaped body 321a, with a head 321b provided with a hole 321c in which there is engaged a stem passing right through frame 30 and carrying a finger 321d visible in Figure 2b, a beak 321e, two wings 321f and 321g, wing 321g being provided with a pin 321h, and a tail 321j, head 321b being arranged on the centre side of the movement and tail 321j at the periphery, in proximity to 7 o'clock,
 - a lever 321k pivotably mounted on tail 321j and extending over the periphery of the movement from 7 to 9 o'clock, provided with a pin 321m disposed so that it is or is not located on the path travelled by push-button 28, and a stop member 321n placed at its free end,
 - a pawl or click 321p pivotably mounted on lever 321k and limited in its movement by stop member 321n,
- 35 - a switching cam, for example a column wheel 322, schematically shown, controlled in rotation by pawl 321p, rotating on frame 30 at 322a,

- an interlocking lever 324, comprising a body of elongated shape 324a, pivotably mounted on frame 30 in its median part, and one of whose ends is provided with a nose 324b arranged for cooperating with the columns of wheel 322, whereas the other end comprises a first oblong hole 324c in which a stud 325 is mounted to slide, for cooperating with control device 34, and a second oblong hole 324d, in which a pin 326 with a head is housed, itself secured to frame 30, for positioning lever 324 in the plane of the movement.

The constituent parts of locking device 32 are positioned by springs schematically represented by an arrow, and more particularly:

- body 321a by spring F321a,
- lever 321k by spring F321k which tends to return it when pressure has been applied to push-button 28,
- pawl 321p by spring F321p which holds it pressed against pin 321n,
- body 324a by spring F324a, which tends to apply nose 324b against wheel 322, and
- stud 325 by spring F325, which tends to press it on the external side of oblong hole 324c.

Control device 34, more particularly visible in Figure 2b comprises in particular:

- a control lever 341 comprising:
 - a body 341a arranged at the periphery of the movement from 2 to 7 o'clock, which pivots at 341b on frame 30 slightly below 4 o'clock, and which is provided, at one of its ends, with a bent portion 341c extending into the thickness of stud 325, and
 - a pawl 341d, pivotably mounted on the other end of body 341a, whose function will be specified hereinafter,
- a cam 342, for example of the column wheel type, driven by pawl 341d, which controls the coupling of the chronograph, not shown in the drawing, and positions switching member 321 by its finger 321d.

The constituent parts of control device 34 are positioned by springs and more particularly:

- body 341a, by spring F341a which tends to return it when pressure has been applied to push-button 24, and
- pawl 341d, by spring F341d, which applies it against cam 342.

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Reset device 36 is formed in particular by a lever 361 and a hammer 362.

Lever 361 is provided with a pin 361a arranged opposite push-button 26 and a groove 361b placed so that it can act as a housing for pin 321h when finger 321d is abutting
10 against a column of cam 342. A spring F361 tends to push lever 361 back against the push-button. The hammer is also subjected to an elastic force by a spring F362 holding it pressed against wheel 322.

Hammer 362 will not be described in more detail. It is designed to cooperate with
15 cams carried by the mobiles of the chronograph gear train carrying the hands, in order to reset them. Such devices are well known to those skilled in the art.

In the mechanism thus described, push-button 24 acts on lever 341 via stud 325, which abuts against bent portion 341c. Thus, when stud 325 is not inserted between
20 bent portion 341c and push-button 24, an application of pressure on the latter has no effect.

When the chronograph mechanism is locked, nose 324b is abutting against a column of cam 322. In this position, stud 325 is drawn back from push-button 24, which is thus
25 inactive.

If the user exerts pressure on push-button 28, the latter pushes pin 321m, which controls lever 321k. The latter drives pawl 321p which rotates column wheel 322.

30 One of the columns of wheel 322 releases nose 324b which falls between two columns via the effect of spring F324a, such that stud 325 is placed between push-button 24 and bent portion 341c.

Another application of pressure on push-button 28 causes column wheel 322 to rotate
35 through one step, such that nose 324b is lifted up and stud 325 moves away from push-button 24, which becomes inactive again.

When push-button 24 is active, an application of pressure on the latter causes a measurement to start, in accordance with the usual operation of chronograph mechanisms and pivots lever 341 which drives pawl 341d and, with it, cam 342. Finger 321d is raised by a column of cam 342. Pin 321h is then engaged in housing 361b.
5 Moreover, lever 321k is driven by body 321a such that pin 321m is shifted with respect to push-button 28. Consequently, as soon as the chronograph mechanism is started, push-button 28 becomes inactive. In this state, push-button 26 is also inactive. Of course, lever 361 pivots via the effect of an application of pressure on push-button 26, but his movement has no influence on the other parts of the mechanism.

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Another application of pressure on push-button 24 stops the measurement and causes cam 342 to rotate through one step. Finger 321d is then between two columns of the cam. It is not fall however, despite the action of spring F321a, because of pin 321h held in housing 361b. Push-button 28 thus remains inactive.

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If push-button 24 is again subject to an application of pressure, the measurement starts again and finger 321d abuts against a column.

If an application of pressure is exerted on push-button 26 when the measurement is interrupted, i.e. when finger 321d is between two columns of cam 342, lever 361 tips and releases pin 321h. Body 321a tips via the effect of spring F321a, and with it lever 321k. Pin 321m is then again opposite push-button 28 which becomes active again. The movement of body 321 also releases hammer 362 which resets the measured time minute hands to zero.

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Pressing on push-button 28 causes the chronograph mechanism to return to its locked state and minute hand 16 passes from zero to displaying the current time, as was explained hereinbefore.

30 Figure 3 shows a watch whose case 10, time setting crown 22 and two push buttons 24 and 26 can be seen. Figure 3a also shows dial 12.

Crown 22 is used for setting information relating to the current time, push-button 24 for controlling the starting and stopping of a chronograph mechanism, and push-button 26
35 for resetting it. This watch is shown in Figure 3a in cross-section along a plane A-A perpendicular to the drawing and in Figures 3b₁ and 3b₂ in cross-section along a plane B-B that is also perpendicular, in the locked position of push-button 24 at 3b₁ and the

released position at 3b₂. Figures 3c and 3d show, seen from the side as indicated by arrows C and D, a part of the watch with the push-buttons respectively in the locked position and released position.

- 5 In these Figures, the chronograph mechanism is only shown schematically, by a portion of control lever 40 and reset lever 42, these portions respectively cooperating with push-buttons 24 and 26. This mechanism can be of any type controlled by two push-buttons.
- 10 Case 10 further carries, at 8 o'clock, a second crown 44 which, as can be seen in Figure 3a, is secured to a stem 46 passing through the wall of case 10. Stem 46 is provided with a pinion 48 mounted on a square 46a of stem 46 and held by a screw 50 engaged in a threading made in stem 46.
- 15 The watch is also fitted with a ring 52 disposed inside case 10, adjacent to the inner wall of the middle part and to dial 12, which forms with crown 44, stem 46 and pinion 48, a device for locking push-buttons 24 and 26.

- Ring 52 is provided, in its portion close to crown 44, with a sector of contrate toothing 20 52a, which meshes with the toothing of pinion 48, thus allowing it to be driven in rotation, over a limited angle. As will be explained hereinafter, ring 52 is used for locking push-buttons 24 and 26.

- Figures 3b₁ and 3b₂ show push-button 24 in cross-section, engaged in case 10, 25 respectively in the locked and free positions. A tube 54, driven into a hole in case 10, acts as a housing for push-button 24. The latter is formed of an external button 24a, on which the user presses, and a stem 24b screwed onto button 24a and engaged in tube 54. A sealing gasket 24c is housed on stem 24b and abuts against the inner end of button 24a, whereas a helical spring 55 surrounds stem 24b and is supported on the 30 one hand in the bottom of tube 54, and on the other hand, against sealing gasket 24c returning push-button 24 when it is subject to pressure. A washer can advantageously be inserted between spring 55 and sealing gasket 24c.

- Push-button 24 is held in case 10 by means of a screw 56 engaged in a threaded hole 35 of stem 24b, which is not visible in the drawing. This screw is provided with a head 56a, which cooperates with lever 40 to control the chronograph mechanism. Head 56a has a groove 56b extending radially into its cylindrical portion.

In order to lock push-button 24, ring 52 comprises a cylindrical portion 52b, whose inner and external diameter and height are such that the portion can be engaged in groove 56b, as shown in Figure 3c.

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Portion 52b is provided with a rounded cut out portion 52c, disposed such that, when it is aligned on push-button 24, the groove is released, which makes the movement of push-button 24 possible.

- 10 When ring 52 is in one of its end positions, cut out portion 52c is aligned on axis B-B, such that push-button 24 can be activated. In the other position, ring 52 is engaged in groove 56b, thus locking push-button 24.

- 15 Push-button 26, which has the same structure as push-button 24 cooperates with ring 52 in an identical manner to the latter. A detailed description would thus add nothing further to comprehension of the device.

- 20 In an advantageous manner, the two end positions of ring 52 can be defined by a jumper spring which has not been shown in the drawing, which would have the advantage of clearly marking these two positions. Moreover, in order to allow the user to know whether or not the mechanism is operating, ring 52 is provided with a display zone 52c comprising two marks, for example of different colours 52d and 52e, one or other of which appears, in an aperture 12a of dial 12, thus showing which position ring 52 is occupying and, consequently, whether the mechanism is operating or locked.

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The variant shown in Figures 4 to 4d differs from that of Figures 3 to 3d in that ring 52 does not lock push-buttons 24 and 26 but makes them active or inactive via the insertion of an elastic member. In this variant, the same parts bear the same references as in Figures 3 to 3d.

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- 35 In this variant, ring 52 is made of elastic material, for example steel or beryllium bronze. It also includes a cylindrical portion 52b, but into which strips 52f are cut, secured to the cylindrical portion at one of their ends, and free and forming, by bending, a finger 52g at the other end. This finger 52g is at the same level as screw head 56a. Consequently, if strip 52f is opposite screw head 56a, an action on push-button 24 makes screw head 56a abut against strip 52f, finger 52g pushing lever 40. In proximity to bent portion 52g, the cylindrical portion is interrupted, such that, if the ring

is rotated to bring it into the second position, the strip is no longer opposite screw head 56a, the movement of push-button 24 then occurring in the void.

5 The various embodiments described hereinbefore can be subject to numerous variants. It is thus possible to fit the locking device with means for placing gaskets 24c under stress, in order to reinforce the water resistance of the watch.

10 The function of the control member could also be performed by a time setting crown 22 in its pushed-in position, especially if the movement includes a quartz time base and an electrical energy source.

Thus, owing to the various embodiments of the device described hereinbefore, it is possible to propose chronograph-type watches offering improved operating reliability.